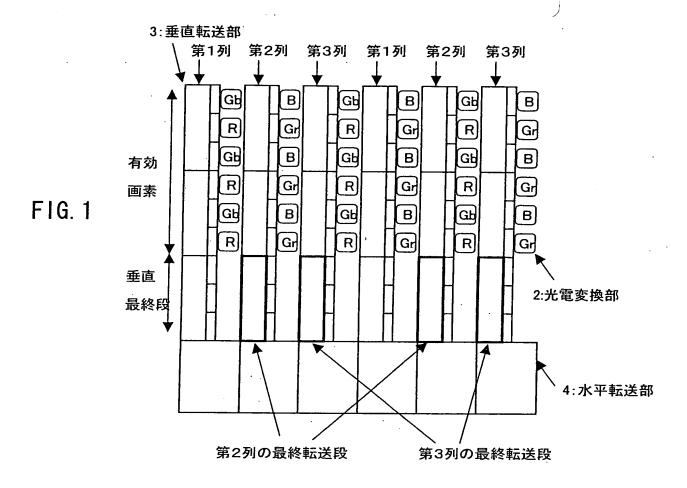
Inventor: Nagayoshi, et al Docket No.: 10873.1355US01 Title: SOLID-STATE IMAGE SENSING DEVICE AND CAMERA USING THE SAME Attorney Name: Douglas P. Mueller Phone No.: (612) 371-5237 Sheet 1 of 35



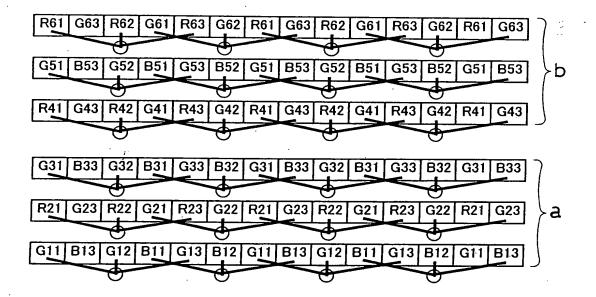


FIG. 2

Inventor: Nagayoshi, et al Docket No.: 10873.1355US01

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Attorney Name: Douglas P. Mueller

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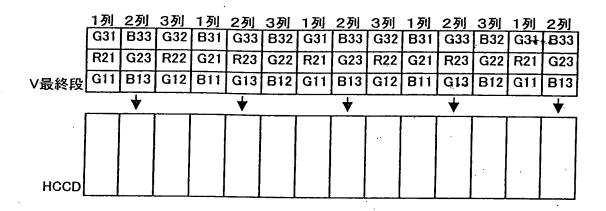


FIG. 3

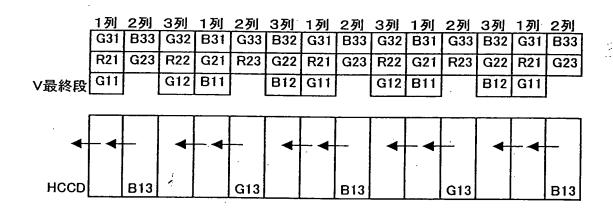


FIG. 4

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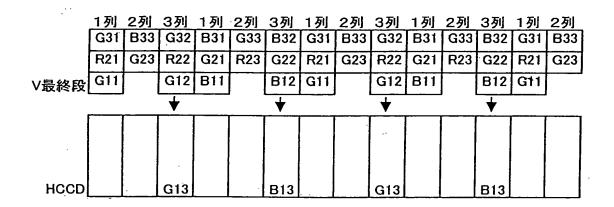


FIG. 5

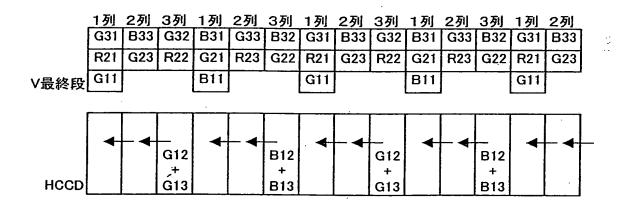


FIG. 6

Inventor: Nagayoshi, et al Docket No.: 10873.1355US01

Title: SOLID-STATE IMAGE SENSING DEVICE AND CAMERA USING THE SAME

Attorney Name: Douglas P. Mueller

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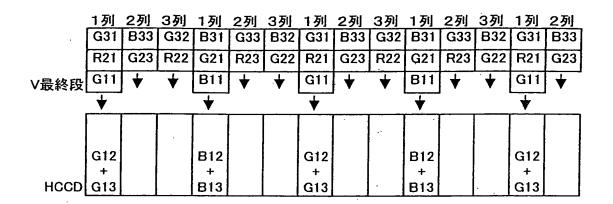


FIG. 7

	1列	2列	3列	1列	2列									
	R41	G43	R42	G41	R43	G42	R41	G43	R42	G41	R43	G42	R41	G43
	G31	B33	G32	B31	G33	B32	G31	B33	G32	B31	G33	B32	G31	B33
V最終段	R21	G23	R22	G21	R23	G22	R21	G23	R22	G21	R23	G22	R21	G23
	G11			B11			G11			B11	·		G11	
	+			+			+			+.			+	
	G12			B12			G12			B12			G12	
	+		4	.+-			+			+			+	l
HCCD	G13			B13			G13			B13			G13	

FIG. 8

Inventor: Nagayoshi, et al Docket No.: 10873.1355US01 Title: SOLID-STATE IMAGE SENSING DEVICE AND CAMERA USING THE SAME

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1列 2列 3列 1列 2列 3列 1列 2列 1列 2列 3列 1列 2列 3列 G51 **B53** G52 **B51 G53** B52 G51 **B53** G52 B51 G53 **B52** G51 **B53** R43 **G42 R41** G43 R41 G43 **R42 G41** R43 G42 **R41 G43** R42 G41 B33 B32 G31 **B33** G31 G32 **B31** G33 G31 **B33** G32 **B31 G33 B32** R21 R21 G11 G21 B11 R21 G11 G21 B11. + + + + + ++ + + **G22 R22 R22 G12 G22 B12 R22** G12 B12 + + + + + + + + + G23 G13 G23 R23 **R23** G13 B13 R23 B13

FIG. 9

				2列									
R61	G63	R62	G61	R63	G62	R61	G63	R62	G61	R63	G62	R61	G63
G51	B53	G52	B51	G53	B52	G51	B53	G52	B51	G53	B52	G51	B53
R41	G43	R42	G41	R43	G42	R41	G43	R42	G41	R43	G42	R41	G43
G31	B11	R21	B31	G11	G21	G31	B11	R21	B31	G11	G21	G31	B11
+	+	+	+	+	+	+	+	+	+	+	+	+	+
G32	B12	R22	B32	G12	G22	G32	B12			G12	G22	G32	B12
+	+	<i>j</i> +	+	+	+	+	+	+	+	+	+	+	+
G33	B13	R23	B33	G13	G23	G33	B13	R23	B33	G13	G23	G33	B13

FIG. 10

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1列	2列	3列	1列	2列	3列	1列	2列	3列	1列	2列	3列	1列	2列
R61	G63	R62	G61	R63	G62	R61	G63	R62	G61	R63	G62	R61	G63
G51	B53	G52	B51	G53	B52	G51	B53	G52	B51	G53	B52	G51	B53
R41	G43	R42	G41	R43	G42	R41	G43	R42	G41	R43	G42	R41	G43
L		L	L	L	I			L	l	<u> </u>			
C21	D11	B21	B31	G11	G21	G31	B11	R21	B31	G11	G21	G31	B11

					1	1 -	4	i +-	1 +	B31 +	- -	+		L_+ I
•	G32	B12	R22	B32	G12	G22	G32	B12	R22	B32	G12	G22	G32	B12
	+	+	+	+	+	+	+	+	+	+	+	+	+	_ + _
	G33	B13	R23	B33	G13	G23	G33	B13	R23	B33	G13	G23	G33	+ B13
	a6	a1								аЗ				

FIG. 11

1列	2列	3列	1列	2列									
G31	B33	G32	B31	G33	B32	G31	B33	G32	B31	G33	B32	G31	B33
R21	G23	R22	G21	R23	G22	R21	G23	R22	G21	R23	G22	R21	G23
G11	B13	G12	B11	G13	B12	G11	B13	G12	B11	G13	B12	G11	B13

													044
R61	G41	G51	G61	R41	B51	R61	G41	G51	G61	R41	B51	R61	G41
1,,0,1	U71								1				
1 +	+	+-	+-	- 1	+	I -		+	+	+	1 7 1		T-
	• .	1				200	0.40	050	000	D42	DEA	DE2	GA2
R62	l G42	G52	G62	R42	B52	K62	G42	GOZ	GOZ	1742	D 32	NUZ	GTZ
		<u> </u>									- 1	+	+
+	+	+ //	+	+	+ 1	+	1 +	T :	T			•	
	ا مما	ará l		D42	DEO	Dea	C42	CE2	CES	DA3	B53	R63	G43
1 K63	G43	G53	GOS	K43	DOO	KOS	43	GJ3	GUS	1170	000	1,00	

FIG. 12

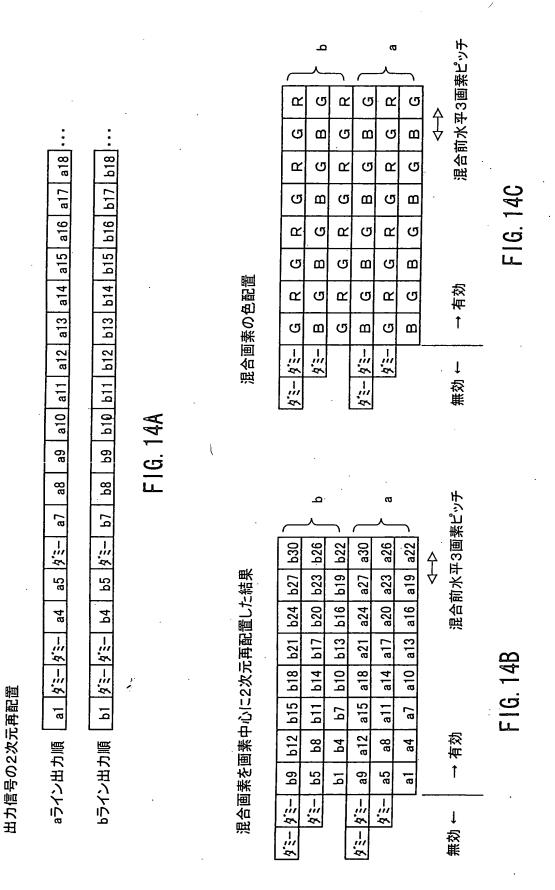
Inventor: Nagayoshi, et al
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Attorney Name: Douglas P. Mueller
Phone No.: (612) 371-5237
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	1列	2列	3列	1列	2列	3列	1列	2列	3列	1列	2列	3列	1列	2列
	G31	B33	G32	B31	G33	B32	G31	B33	G32	B31	G33	B32	G31	B33
	R21	G23	R22	G21	R23	G22	R21	G23	R22	G21	R23	G22	R21	G23
	G11	B13	G12	B11	G13	B12	G11	B13	G12	B11	G13	B12	G11	B13
									•					
	R61	G41	G51	G61	R41	B51	R61	044		001	544			
		471	GOI	GOI	T41	601	ROI	[G41	G51	GOL	R41	B51	R61	G41
	+	+	+	+	+	+	+	G41	G51	G61	H41 +	B51 +	R61	G41 +
•	+ R62		+ G52	+	+		+_		+	. 1	+	+	+	G41 _+ G42
•	<u> </u>	+	+	+	+	+	+_	+	+	+	+	+	+	_+
•	R62	+ G42	+ G52	+ G62 +	+ R42 +	+ B52 +	+ R62 +	+ G42 +	+ G52	+ G62	+ R42 +	+ B52 +	+ R62	_+ G42

FIG. 13

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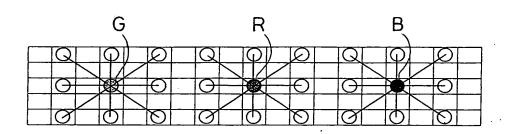
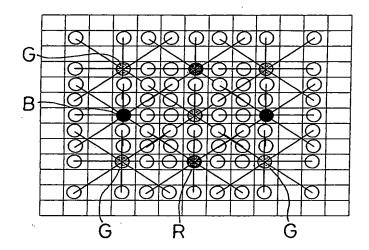


FIG. 15



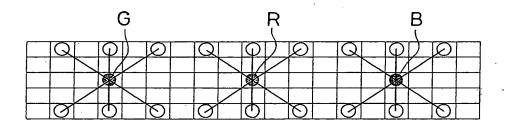
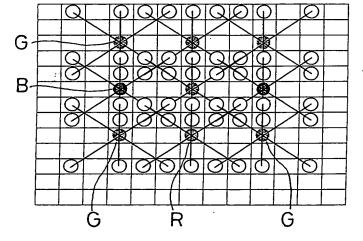


FIG. 16



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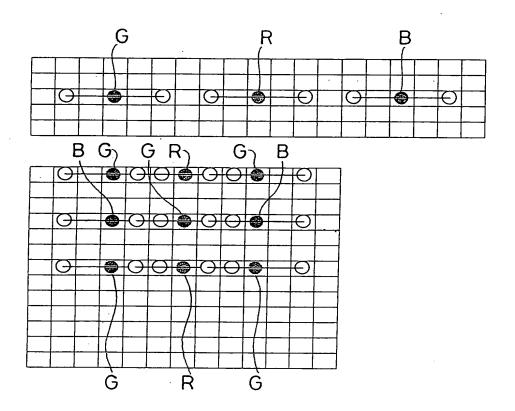


FIG. 17

Inventor: Nagayoshi, et al Docket No.: 10873.1355US01

Title: SOLID-STATE IMAGE SENSING DEVICE AND CAMERA USING THE SAME Attorney Name: Douglas P. Mueller Phone No.: (612) 371-5237

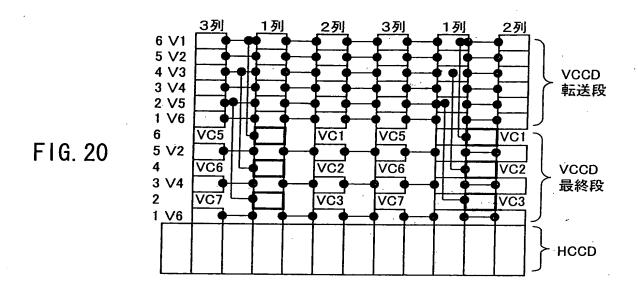
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3列 1列 3列 6 V1 5 V2 4 V3 **VCCD** 3 V4 転送段 2 V5 1 V6 6 V1 FIG. 18 5 V2 4 VC3 VC1 VC3 VC1 **VCCD** 3 V4 最終段 VC4 2 VC2 VC4 VC2 1 <u>V6</u> HCCD

3列 1列 2列 3列 6 V1 5 V2 4 V3 **VCCD** 3 V4 転送段 2 V5 1 V6, 6 V1 FIG. 19 5 V2 4 3 V4 VC3 VC5 VC1 VC3 VC5 VC1 **VCCD** 最終段 2 VC6 VC4 VC6 VC2 VC4 VC2 1 <u>V6</u> HCCD

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3列 1列 6 V1 5 V2 4 V3 VCCD 3 V4 転送段 2 V5 FIG. 21 1 V6 6 VC5 VC8 VC1 VC5 VC8 VC1 5 V2 4 VC6 VC9 VC2 VC6 VC9 VC2 **VCCD** 3 V4 最終段 VC10 VC3 2 VC7 VC7 VC10 VC3 1 V6 HCCD

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Title: SOLID-STATE IMAGE SENSING DEVICE AND CAMERA USING THE SAME Attorney Name: Douglas P. Mueller Phone No.: (612) 371-5237 Sheet 13 of 35

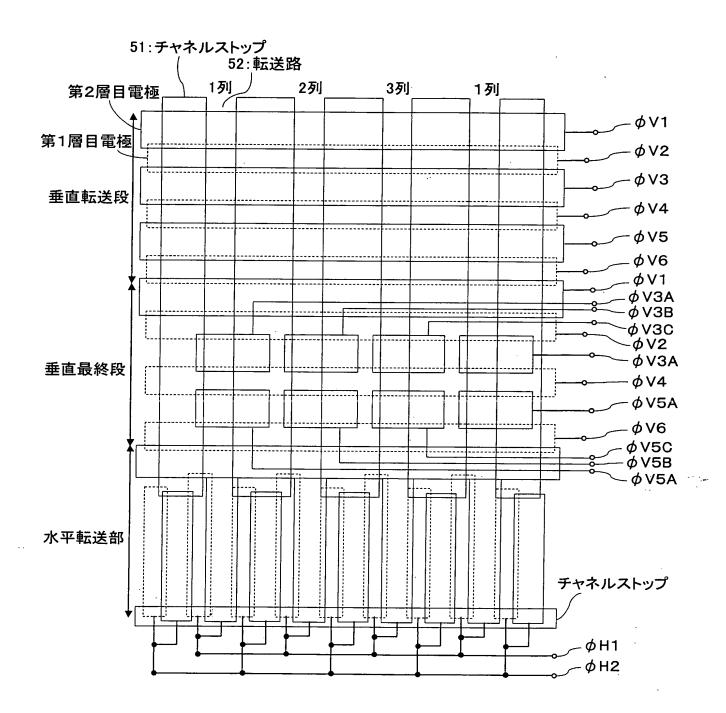


FIG.22

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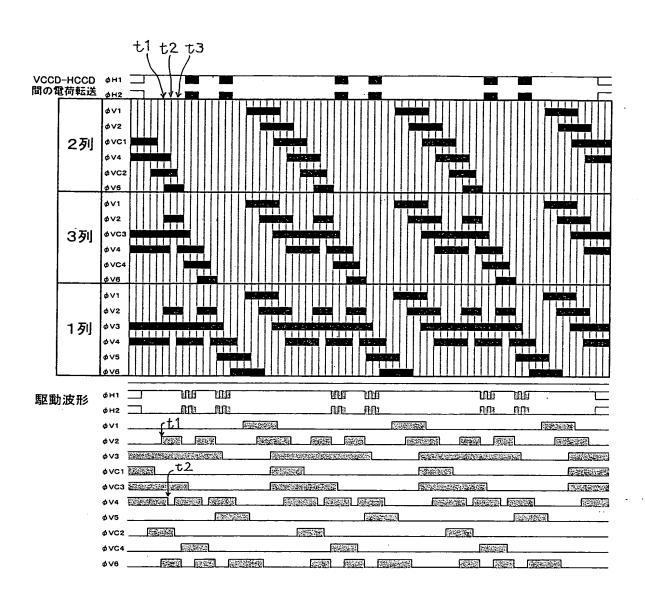


FIG. 23

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Attorney Name: Douglas P. Mueller Phone No.: (612) 371-5237

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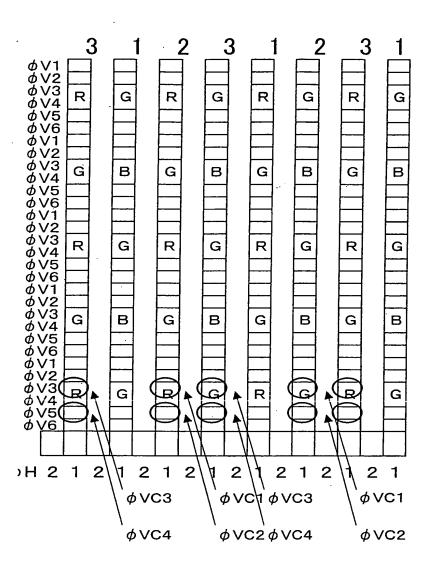


FIG. 24

Inventor, Nagayoshi, et ai
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【電極構造】

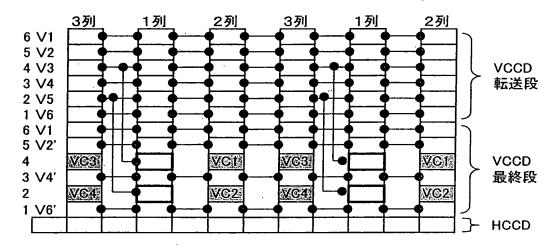


FIG. 25

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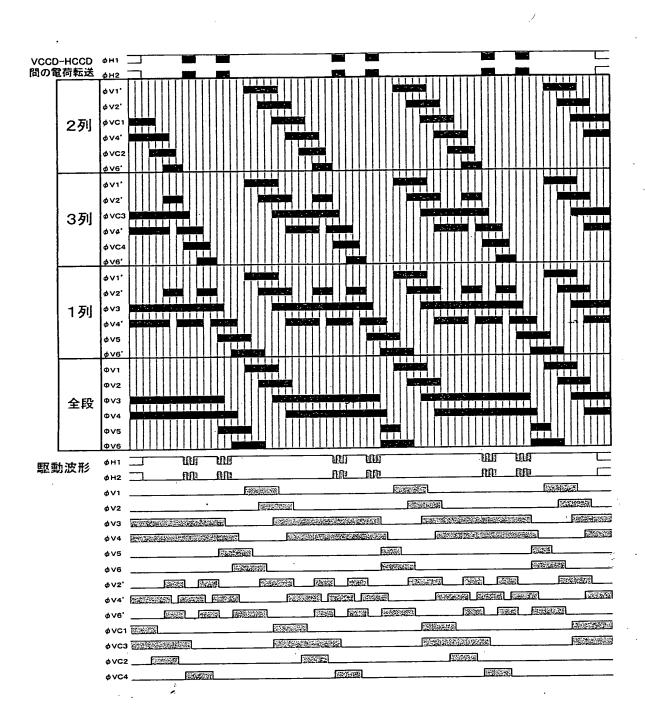
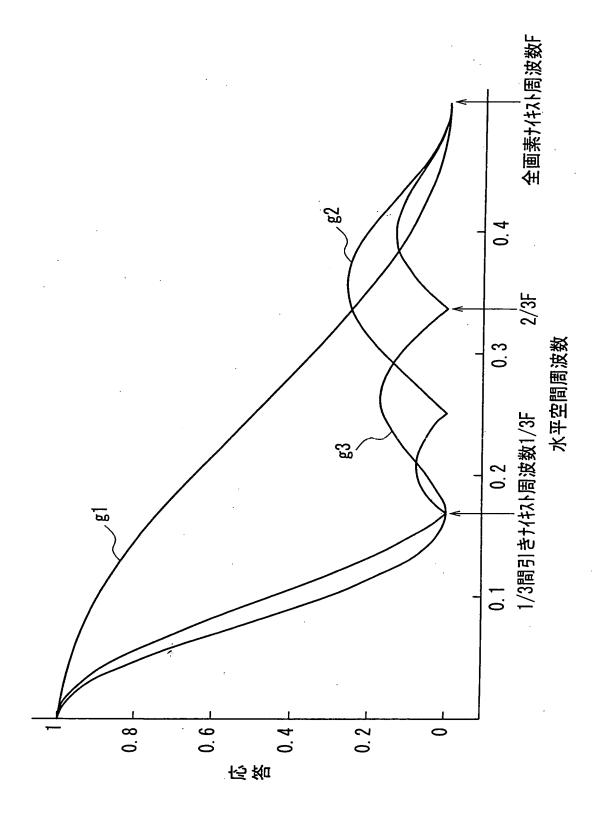


FIG. 26

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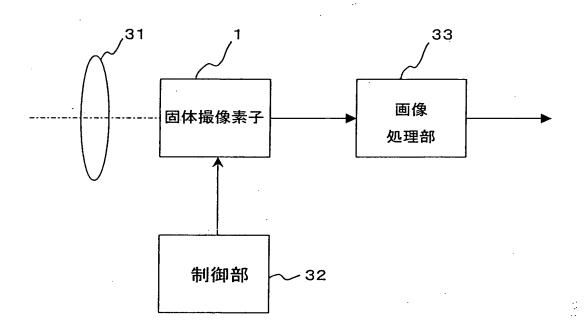


FIG. 28

Inventor: Nagayoshi, et al

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Title: SOLID-STATE IMAGE SENSING DEVICE AND CAMERA USING THE SAME
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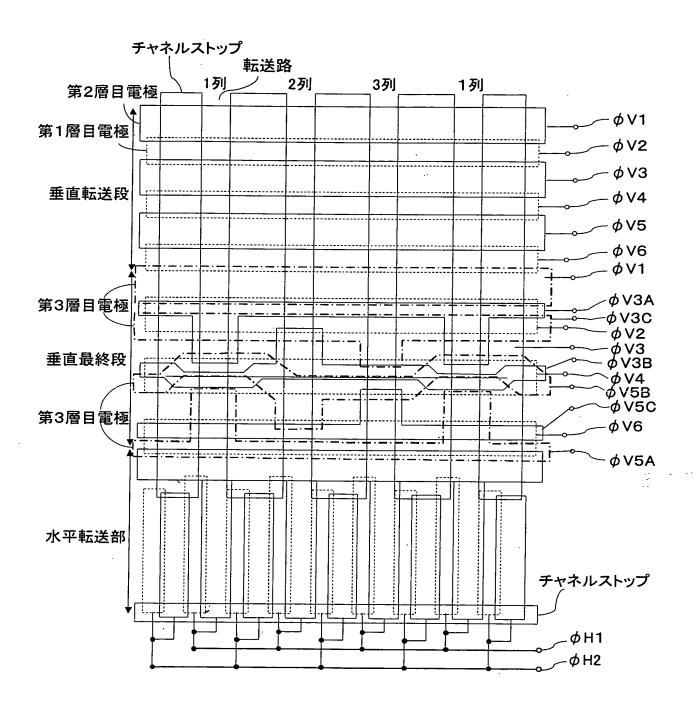


FIG.29

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	81	82	83	84	85	86	87	88
	71	72	73	74	75	76	77	78
	61	62	63	64	65	66	67	68
	51	52	53	54	55	56	57	58
	41	42	43	44	45	46	47	48
i	31	32	33	34	35	36	37	38
	21	22	23	24	25	26	27	28
ž	11	12	13	14	15	16	17	18

FIG.30

V最終段

HCCD

		ŀ				i I
				l		
				l		
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				1	l i	
		1				
		l i				1
		•				
HCCD			i			

FIG.31

	81	82	83	84	85	86	87	88
	71	72	73	74	75	76	77.	78
	61	62	63	64	65	66	67	68
	51	52	53	54	55	56	57	58
	41	42	43	44	45	46	47	48
=	31	32	33	34	35	36	37	38
	21	22	23	24	25	26	27	28
V最終段	11	12		14	15		17	18
	-	:	Δ			\forall		

16

21/35

13

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81	82	83	84	85	86	87	88
71	72	73	74	75	76	77	78
61	62	63	64	65	66	67	68
51	52	53	54	55	56	57	58
41	42	43	44	45	46	47	48
31	32	33	34	35	36	37	38
21	22	23	24	25	26	27	28
11	12		14	15		17	18

FIG.32

V最終段し

	1		
1 1		1 1	1 1
1 1		1 1	1 1
	1 1		1 1
	1 1		1 1
		i I	1 1
1	i l]	1 1
1	1	1 1	
13 ◀──	16	₩	1 19 1
	13 📥	13 - 16	13 - 16 -

FIG.33 V最終段

HCCD

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	81	82	83	84	85	86	87	88
	71	72	73	74	75	76	77	78
	61	62	63	64	65	66	67	68
İ	51	52	53	54	55	56	57	58
	41	42	43	44	45	46	47	48
	31	32	33	34	35	36	37	38
	21	22	23	24	25	26	27	28
殳	11			14		.,	17	
- 1								

FIG.34

V最終科

HCCD	12 13 <		15 16) —	18 19	

84

85

86

87

88

82

83

	71	72	73	74	75	76	77	78
	61	62	63	64	65	66	67	68
	51	52	53	54	55	56	57	58
	41	42	43	44	45	46	47	48
i	31	32	33	34	35	36	37	38
	21	22	23	24	25	26	27	28
V最終段								
	↓ /			\Diamond			\Diamond	
	11			14			17	
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HCCD	13	ľ		16	ì	I	10 1	

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i	81	82	83	84	85	86	87	88
	71	72	73	74	75	76	77	78
	61	62	63	64	65	66	67	68
	51	52	53	54	55	56	57	58
	41	42	43	44	45	46	47	48
	31	32	33	34	35	36	37	38
١	21	22	23	24	25	26	27	28

FIG.36

V最終段

	11		14		17	
	12		15		18	
HCCD	13		16		19	

						İ	L	
	81	82	83	84	85	86	87.	88
:	71	72	73	74	75	76	77	78
	61	62	63	64	65	66	67	68
	51	52	53	54	55	56	57	58
	41	42	43	44	45	46	47	48
	31	32	33	34	35	36	37	38
V最終段	21	22		24	25		27	28
		<i>f</i>	\			+		
	4.4							
	11			14			17	
	12			15			18	
HCCD	13		23	16		26	19	
•								

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		,					
81	82	83	84	85	86	. 87	88
71	72	73	74	75	76	77	78
61	62	63	64	65	66	67	68
51	52	53	54	55	56	57	58
41	42	43	44	45	46	47	48
31	32	33	34	35	36	37	38
21	22		24	25		27	28

FIG.38

V最終段

14 17 15 18 **HCCD** 16 19 29

	81	82	83	84	85	86	87	88
	71	72	73	74	75	76	77	78
	61	62	63	64	65	66	67	68
	51	52	53	54	55	56	57	58
	41	42	43	44	45	46	47	48
	31	32	33	34	35	36	37	38
V最終段	21			24			27	
_		\Diamond	,		. 🗸			\Diamond
			14			17		
ļ		22	15		25	18		28
HCCD		23	16		26	19		29

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	81	82	83	84	85	86	87	88
	71	72	73	74	75	76	77	78
	61	62	63	64	65	66	67	68
	51	52	53	54	55	56	57	58
	41	42	43	44	45	46	47	48
	31	32	33	34	35	36	37	38
١.	21			24		••	27	

FIG.40

V最終段_

		1.4			47		:	
	22	14 15		25	17		00	
	22	_	ا ا	25	18	ا ــــــا	28	ĺ
HCCD	23	16	7	26	19	7	29	

	81	82	83	84	85	86	87	88
	71	72	73	74	75	76	77	78
	61	62	63	64	65	66	67	68
	51	52	53	54	55	56	57	58
	41	42	43	44	45	46	47	48
	31	32	33	34	35	36	37	38
V最終段			-					
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	01				4.7		07	
	21	14		24	17		27	
	22	15	3	25	18	1	28	i
HCCD	23	16		26	19		29	

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	81	82	83	84	85	86	87	88
	71	72	73	74	75	76	77	78
	61	62	63	64	65	66	67	68
	51	52	53	54	55	56	57	58
	41	42	43	44	45	46	47	48
١	31	32	33	34	35	36	37	38

FIG.42

V最終段L

	21	14	24	17	27	110	
	22	15	25	18	28	111	
HCCD	23	16	26	19	29	112	ĺ

FIG.43

	81	82	83	84	85	86	87	88
	71	72	73	74	75	76	77	78
	61	62	63	64	65	66	67	68
	51	52	53	54	55	56	57	58
	41	42	43	44	45	46	47	48
V最終段	31	32		34	35		37	38
			7			꾸		

HCCD [

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		1]		<u> </u>	
81	82	83	84	85	86	87	88
71	72	73	74	75	76	77	78
61	62	63	64	65	66	67	68
51	52	53	54	55	56	57	58
41	42	43	44	45	46	47	48
31	32		34	35		37	38

FIG.44

V最終段

	14		24	17		27	110	
	15	∤ ∣	25	18	├	28	111	
HCCD	16	33	26	_19	36	29	112	39

		<u> </u>						
					,			
	81	82	83	84	85	86	87	88
	71	72	73	74	75	76	77	78
	61	62	63	64	65	66	67	68
	51	52	53	54	55	56	57	58
	41	42	43	44	45	46	47	48
V最終段	31			34			37	
	,	\Diamond	-		4			\Diamond
}	14		24	17		07	110	
			24	17		27	110	
	15	32	25	18	35	28	111	38
HCCD	16	33	26	19	36	29	112	39

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FIG.46

V最終段

		24	17		27	110		210
	32	25	18 19	35	28	111 1112	38	211
HCCD	_33	26 \	19	36	29 ~	112	39	212

FIG.47 V最終段 $\frac{1}{4}$ \triangle $\frac{\wedge}{}$ HCCD

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FIG.48

					,		
G81	R82	G83	R84	G85	R86	G87	R88
B71	G72	B73	G74	B75	G76	B77	G78
G61	R62	G63	R64	G65	R66	G67	R68
B51	G52	B53	G54	B55	G56	B57	G58
G41	R42	G43	R44	G45	R46	G47	R48
B31	G32	B33	G34	· B35	G36	B37	G38
G21	R22	G23	R24	G25	R26	G27	R28
B11	G12	B13	G14	B15	G16	B17	G18

81	82	83	84	85	86	87	88
71	72	73	74	75	76	77	78
61	62	63	64	65	66	67	68
51	52	53	54	55	56	57	58
41	42	43	44	45	46	47	48
31	32	33	34	35	36	37	38
21	22	23	24	25	26	27	28
11	12	13	14	15	16	17	18

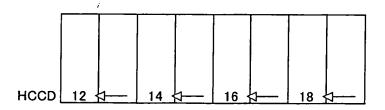
	:			
HCCD				

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!	81	82	83	84	85	86	87	88
	71	72	73	74	75	76	77	78
	61	62	63	64	65	66	67	68
	51	52	53	54	55	56	57	58
	41	42	43	44	45	46	47	48
	31	32	33	34	35	36	37	38
	21	22	23	24	25	26	27	28
V最終段	11		13		15		17	
		\Diamond		\Diamond		\Diamond		\Diamond
HCCD		12		14		16	_	18

FIG.51

			,					
•	81	82	83	84	85	86	87	88
	71	72	73	74	75	76	77	78
	61	62	63	64	65	66	67	68
	51	52	53	54	55	56	57	58
	41	42	43	44	45	46	47	48
	31	32	33	34	35	36	37	38
	21	22	23	24	25	26	27	28
V最終段	11		13		15		17	



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V最終段 \triangle \triangle φ HCCD

FIG.53

FIG.52

	81	82	83	84	85	86	87	88
:	71	72	73	74	75	76	77	78
	61	62	63	64	65	66	67	68
	51	52	53	54	55	56	57	58
	41	42	43	44	45	46	47	48
	31	32	33	34	35	36	37	38
V最終段	21	22	23	24	25	26	27	28
ĺ								

.11 HCCD

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					,			
	81	82	83	84	85	86	87	88
	71	72	73	74	75	76	77	78
	61	62	63	64	65	66	67	68
	51	52	53	54	55	56	57	58
•	41	42	43	44	45	46	47	48
	31	32	33	34	35	36	37	38
V最終段	21	22	23	24	25	26	27	28

FIG.54

15

17

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13

HCCD

	81	82	83	84	85	86	87	88
	71	72	73	74	75	76	77	78
	61	62	63	64	65	66	67	68
	51	52	53	54	55	56	57	58
	41	42	43	44	45	46	47	48
	31	32	33	34	35	36	37	38
V最終段		22		24		26		28
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		13		15	ļ	17		19
HCCD	21	14	23	16	24	18	27	110

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FIG.56

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		<u> </u>						
	81	82	83	84	85	86	87	88
	71	72	73	74	75	76	77	78
	61	62	63	64	65	66	67	68
	51	52	53	54	55	56	57	58
	41	42	43	44	45	46	47	48
	31	32	33	34	35	36	37	38
V最終段		22		24		26		28

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HCCD	14	700		704	40 1	7	440	N
HCCD	14	23	16	24	_18	2/	_110	29

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	81	82	83	84	85	86	87	88
	71	72	73	74	75	76	77	78
	61	62	63	64	65	66	67	68
	51	52	53	54	55	56	57	58
İ	41	42	43	44	45	46	47	48
	31	32	33	34	35	36	37	38
V最終段								
_	2	\Diamond		\Diamond		\Diamond		\Diamond
	13	22	15	24	17	26	19	28
HCCD	14	23	_16	25	18	27	110	29

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C	81	82 ^C	83	84 (85	86 ^C	87	88
	71 9	72	73	74	75 ^C	76	77 (78
Ċ	61	62	63	64	65	66 ^C	67	68
	51 C	52	53 🤇	54	55 ^{<}	56	57 ^C	58
ζ	41	42	43	44 (45	46	47	48
	31	32	33 🤄	34	35 C	36	37 🤇	38
4	21	22	23	24	25	26	27	28 <
	11 <	12	13	14	15 C	16	17 🤇	18